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TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

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TITLE OF INVENTION: A SYSTEM, METHOD AND ARTICLE OF MANUFACTURE FOR A GOAL BASED FLOW OF CONTROL PRESENTATION SYSTEM

APPLICANT(S) FOR DO/EO/US: NICHOLS

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [x] This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. [ ] This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. [ ] This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. [x] The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. [x] A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   - a. [ ] is attached hereto (required only if not communicated by the International Bureau).
   - b. [x] has been communicated by the International Bureau.
   - c. [x] is not required, as the application was filed in the United States Receiving Office (RO/US).
6. [ ] An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   - a. [ ] is attached hereto.
   - b. [ ] has been previously submitted under 35 U.S.C. 154(d)(4).
7. [ ] Amendments to the claims of the International Aplication under PCT Article 19 (35 U.S.C. 371(c)(3))
   - a. [ ] are attached hereto (required only if not communicated by the International Bureau).
   - b. [ ] have been communicated by the International Bureau.
   - c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.
   - d. [ ] have not been made and will not be made.
8. [ ] An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).
9. [ ] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. [ ] An English lanugage translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. [ ] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. [ ] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. [ ] A FIRST preliminary amendment.
14. [ ] A SECOND or SUBSEQUENT preliminary amendment.
15. [ ] A substitute specification.
16. [ ] A change of power of attorney and/or address letter.
17. [ ] A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. [ ] A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. [ ] A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. [x] Other items or information:
   International Publication WO 00/38142
   International Preliminary Examination Report
   2 Forms PCT/IB/306

09/868752

A SYSTEM, METHOD AND ARTICLE OF MANUFACTURE FOR A GOAL BASED FLOW OF CONTROL PRESENTATION SYSTEM

Field Of The Invention

The present invention relates to education systems and more particularly to a rule based tutorial system that controls the flow of processing in business simulations of actual environments to teach new skills.

Background of the Invention

When building a knowledge based system or expert system, at least two disciplines are necessary to properly construct the rules that drive the knowledge base, the discipline of the knowledge engineer and the knowledge of the expert. The domain expert has knowledge of the domain or field of use of the expert system. For example, the domain expert of an expert for instructing students in an automotive manufacturing facility might be a process control engineer while the domain expert for a medical instruction system might be a doctor or a nurse. The knowledge engineer is a person that understands the expert system and utilizes the expert's knowledge to create an application for the system. In many instances, the knowledge engineer and domain expert are separate people who have to collaborate to construct the expert system.

Typically, this collaboration takes the form of the knowledge engineer asking questions of the domain expert and incorporating the answers to these questions into the design of the system. This approach is labor intensive, slow and error prone. The coordination of the two separate disciplines may lead to problems. Although the knowledge engineer can transcribe input from the expert utilizing videotape, audio tape, text and other sources, efforts from people of both disciplines have to be expended. Further, if the knowledge engineer does not ask the right questions or asks the questions in an incorrect way, the information utilized to design the knowledge base could be incorrect. Feedback to the knowledge engineer from the expert system is often not available in prior art system until the construction is completed. With conventional system, there is a time consuming feedback loop that ties together various processes from knowledge acquisition to validation.

Educational systems utilizing an expert system component often suffer from a lack of motivational aspects that result in a user becoming bored or ceasing to complete a training program. Current training programs utilize static, hard-coded feedback with some linear video and graphics used to add visual appeal and illustrate concepts. These systems typically support one "correct" answer and navigation through the system is only supported through a single defined path which results in a two-dimensional generic interaction, with no business model support and a single feedback to the learner of correct or incorrect based on the selected response. Current tutorial systems do not architect real business simulations into the rules to provide a creative learning environment to a user.

SUMMARY OF THE INVENTION

According to a broad aspect of a preferred embodiment of the invention, a goal based learning system utilizes a rule based expert training system to provide a cognitive educational experience. The system provides the user with a simulated environment that presents a business opportunity to understand and solve optimally. Mistakes are noted and remedial educational material presented dynamically to build the necessary skills that a user requires for success in the business endeavor. The system utilizes an artificial intelligence engine driving individualized and dynamic feedback with synchronized video and graphics used to simulate real-world environment and interactions. Multiple "correct" answers are integrated into the learning system to allow individualized learning experiences in which navigation through the system is at a pace controlled by the learner. A robust business model provides support for realistic activities and allows a user to

Figure 2 is a block diagram of a system architecture in accordance with a preferred embodiment. The Presentation 'layer' 210 is separate from the activity 'layer' 220 and communication is facilitated through a set of messages 230 that control the display specific content topics. A preferred embodiment enables knowledge workers 200 & 201 to acquire complex skills rapidly, reliably and consistently across an organization to deliver rapid acquisition of complex skills. This result is achieved by placing individuals in a simulated business environment that "looks and feels" like real work, and challenging them to make decisions which support a business' strategic objectives utilizing highly effective learning theory (e.g., goal based learning, learn by doing, failure based learning, etc.), and the latest in multimedia user interfaces, coupled with three powerful, integrated software components. The first of these components is a software Solution Construction Aid (SCA) 230 consisting of a mathematical modeling tool 234 which simulates business outcomes of an individual's collective actions over a period of time. The second component is a knowledge system 250 consisting of an HTML content layer which organizes and presents packaged knowledge much like an online text book with practice exercises, video war stories, and a glossary. The third component is a software tutor 270 comprising an artificial intelligence engine 240 which generates individualized coaching messages based on decisions made by learner.

Feedback is unique for each individual completing the course and supports client cultural messages 242 "designed into" the course. A business simulation methodology that includes support for content acquisition, story line design, interaction design, feedback and coaching delivery, and content delivery is architected into the system in accordance with a preferred embodiment. A large number of "pre-designed" learning interactions such as drag and drop association of information 238, situation assessment/action planning, interviewing (one-on-one, one-to-many), presenting (to a group of experts/executives), metering of performance (handle now, handle later), "time jumping" for impact of decisions, competitive landscape shift (while "time jumping", competitors merge, customers are acquired, etc.) and video interviewing with automated note taking are also included in accordance with a preferred embodiment.

Business simulation in accordance with a preferred embodiment delivers training curricula in an optimal manner. This is because such applications provide effective training that mirrors a student's actual work environment. The application of skills "on the job" facilitates increased retention and higher overall job performance. While the results of such training applications are impressive, business simulations are very complex to design and build correctly. These simulations are characterized by a very open-ended environment, where students can go through the application along any number of paths, depending on their learning style and prior experiences/knowledge.

A category of learning approaches called Learn by Doing, is commonly used as a solution to support the first phase (Learn) of the Workforce Performance Cycle. However, it can also be a solution to support the second phase (Perform) of the cycle to enable point of need learning during job performance. By adopting the approach presented, some of the benefits of a technology based approach for building business simulation solutions which create more repeatable, predictable projects resulting in more perceived and actual user value at a lower cost and in less time are highlighted.

Most corporate training programs today are misdirected because they have failed to focus properly on the purpose of their training. These programs have confused the memorization of facts with the ability to perform tasks; the knowing of "that" with the knowing of "how". By adopting the methods of traditional schools, businesses are teaching a wide breadth of disconnected, decontextualized facts and figures, when they should be focused on improved performance. How do you teach performance, when lectures, books, and tests inherently are designed around facts and figures? Throw away the lectures, books, and tests. The best way to prepare for high performance is to perform; experience is the best teacher! Most

has specific knowledge architected into its design to enhance remediation and teaching. There is a suite of testing tools for the ICAT. These tools allow designers and developers test all of their feedback and rules. In addition, the utilities let designers capture real time activities of students as they go through the course. The tools and run-time engine in accordance with a preferred embodiment include expert knowledge of remediation. These objects include logic that analyzes a student's work to identify problem areas and deliver focused feedback. The designers need only instantiate the objects to put the tools to work. Embodying expert knowledge in the tools and engine ensures that each section of a course has the same effective feedback structure in place. A file structure in accordance with a preferred embodiment provides a standard system environment for all applications in accordance with a preferred embodiment. A development directory holds a plurality of sub-directories. The content in the documentation directory is part of a separate installation from the architecture. This is due to the size of the documentation directory. It does not require any support files, thus it may be placed on a LAN or on individual computers. When the architecture is installed in accordance with a preferred embodiment, the development directory has an _Arch, _Tools, _Utilities, Documentation, QED, and XDefault development directory. Each folder has its own directory structure that is inter-linked with the other directories. This structure must be maintained to assure consistency and compatibility between projects to clarify project differences, and architecture updates.

The _Arch directory stores many of the most common parts of the system architecture. These files generally do not change and can be reused in any area of the project. If there is common visual basic code for applications that will continuously be used in other applications, the files will be housed in a folder in this directory. The sub-directories in the _Arch directory are broken into certain objects of the main project. Object in this case refers to parts of a project that are commonly referred to within the project. For example, modules and classes are defined here, and the directory is analogous to a library of functions, APIs, etc... that do not change. For example the IcaObj directory stores code for the Intelligent Coaching Agent (ICA). The InBoxObj directory stores code for the InBox part of the project and so on. The file structure uses some primary object references as file directories. For example, the IcaObj directory is a component that contains primary objects for the ICA such as functional forms, modules and classes. The **BrowserObj** directory contains modules, classes and forms related to the browser functionality in the architecture. The **HTMLGlossary** directory contains code that is used for the HTML reference and glossary component of the architecture. The **IcaObj** directory contains ICA functional code to be used in an application. This code is instantiated and enhanced in accordance with a preferred embodiment. The **InBoxObj** directory contains code pertaining to the inbox functionality used within the architecture. Specifically, there are two major components in this architecture directory. There is a new .ocx control that was created to provide functionality for an inbox in the application. There is also code that provides support for a legacy inbox application. The **PracticeObj** directory contains code for the topics component of the architecture. The topics component can be implemented with the HTMLGlossary component as well. The **QmediaObj** directory contains the components that are media related. An example is the QVIDctrl.cls. The QVIDctrl is the code that creates the links between QVID files in an application and the system in accordance with a preferred embodiment. The **SimObj** directory contains the Simulation Engine, a component of the application that notifies the tutor of inputs and outputs using a spreadsheet to facilitate communication. The **StaticObj** directory holds any component that the application will use statically from the rest of the application. For example, the login form is kept in this folder and is used as a static object in accordance with a preferred embodiment. The **SysDynObj** directory contains the code that allows the Systems Dynamics Engine (Powersim) to pass values to the Simulation Engine and return the values to the tutor. The **VBObj** directory contains common Visual Basic objects used in applications. For

debiting or crediting multiple accounts).A Toolbar **1200** and the first transaction of this Task **1210** appear prominently on the display. The student can move forward and back through the stack of transactions. For each transaction, the student must identify which accounts to debit and which to credit. When the student is done, he clicks the Team button. Figure **9** is a feedback display in accordance with a preferred embodiment. The student may attempt to outsmart the system by submitting without doing anything. The ICAT system identifies that the student has not done a substantial amount of work and returns the administrative feedback depicted in Figure 9. The feedback points out that nothing has been done, but it also states that if the student does some work, the tutor will focus on the first few journal entries. Figure **10** illustrates a journal entry simulation in accordance with a preferred embodiment. Figure **11** illustrates a simulated Bell Phone Bill journal entry in accordance with a preferred embodiment. The journal entry is accomplished by debiting Utilities Expenses and Crediting Cash for $700 each. Figure **12** illustrates a feedback display in accordance with a preferred embodiment. After attempting to journalize the first three transactions, the student submits his work and receives the feedback depicted in Figure **12**. The feedback starts by focusing the student on the area of work being evaluated. The ICAT states that it is only looking at the first three journal entries. The feedback states that the first two entries are completely wrong, but the third is close. If the student had made large mistakes on each of the first three transactions, then the ICAT may have given redirect feedback, thinking a global error occurred. The third bullet point also highlights how specific the feedback can become, identifying near misses.

Design Scenario-This Scenario illustrates how the tools are used to support conceptual and detailed design of a BusSim application. Figure **13** illustrates the steps of the first scenario in accordance with a preferred embodiment. The designer has gathered requirements and determined that to support the client's learning objectives, a task is required that teaches journalization skills. The designer begins the design first by learning about journalization herself, and then by using the Knowledge Workbench to sketch a hierarchy of the concepts she want the student to learn. At the most general level, she creates a root concept of 'Journalization'. She refines this by defining sub-concepts of 'Cash related transactions', 'Expense related Transactions', and 'Expense on account transactions'. These are each further refined to whatever level of depth is required to support the quality of the learning and the fidelity of the simulation. The designer then designs the journalization interface. Since a great way to learn is by doing, she decides that the student should be asked to Journalize a set of transactions. She comes up with a set of twenty-two documents that typify those a finance professional might see on the job. They include the gamut of Asset, Expense, Liability and Equity, and Revenue transactions. Also included are some documents that are not supposed to be entered in the journal. These 'Distracters' are included because sometimes errant documents occur in real life. The designer then uses the Domain Model features in the Knowledge Workbench to paint a Journal. An entity is created in the Domain Model to represent each transaction and each source document. Based on the twenty-two documents that the designer chose, she can anticipate errors that the student might make. For these errors, she creates topics of feedback and populates them with text. She also creates topics of feedback to tell the student when they have succeeded. Feedback Topics are created to handle a variety of situations that the student may cause.

The next step is to create profiles that the will trigger the topics in the concept tree (this task is not computational in nature, so the Transformation Component does not need to be configured) . A profile resolves to true when its conditions are met by the student's work. Each profile that resolves to true triggers a topic. To do some preliminary testing on the design, the designer invokes the Student Simulator Test Workbench. The designer can manipulate the Domain Model as if she were the student working in the interface. She drags accounts around to different transactions, indicating how she would like them journalized. She also enters the dollar amounts that she would like to debit or credit each account. She submits her actions

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Complete If Known	
Application Number	09/868,752
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